

File E76343
Project 03CA25063

Issued: 2004-03-05
Revised: 2005-06-27

REPORT

on

COMPONENT - SWITCHES, INDUSTRIAL CONTROL

Tripus Systems GmbH - Und Steuergeraete
Am Hohen Rain 2
89347 Bubesheim, Germany

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D E S C R I P T I O N

PRODUCT COVERED:

USR, CNR - Component - Industrial Control Switches, Relay Type BR01 may be followed by suffixes.

General - These devices are magnetically operated relays that are provided in the following configurations.

Configurations

Four Normally open only

Three Normally open only

Three Normally open - one normally closed.

Two Normally open - Two normally closed.

These relays are intended for use in Industrial Control Equipment where the acceptability of the combination has been determined by Underwriters Laboratories Inc.

RATINGS:

All ratings are per pole, opposite polarity between poles.

Volts	1-phase hp	3-phase hp
110 - 120	1	2
220 - 240	3	5

20A Resistive, 120 V ac

Auxiliary Contact Rating: A300 NO, NC

Coils - 24 V 50 Hz ac, 110 V 50 Hz and 120 V 60 Hz ac, 230 V 50/60Hz ac.

ENGINEERING CONSIDERATIONS (NOT FOR UL REPRESENTATIVE USE):

CNR - Indicates Investigated To Canadian National Standard(s) C22.2 No. 14-M95.

**Note: CNR = Canadian National Standards - Recognized.
USR = United States Standards - Recognized.**

Use - For use only in (or with) complete equipment where the acceptability of the combination is determined by Underwriters Laboratories Inc.

1. This Component has been judged on the basis of the Standard for Industrial Control Equipment (UL 508, Table 47.1 which would cover the Component itself is submitted for unrestricted use).
2. The devices should be mounted in an enclosure having adequate strength, thickness and in the intended manner with adequate spacings required in the end product. The maximum surrounding air temperature in such enclosure shall be 40°C.
3. The devices should be used within their marked ratings.
4. These devices are suitable for factory wiring only.

CONSTRUCTION DETAILS:

Corrosion Protection - The product shall be constructed of corrosion resistant material, or all surfaces of the parts shall be either painted or plated unless otherwise specified.

Tolerances - Unless specified, all dimensions are nominal.

Marking - Pressure sensitive label securely cemented on device, contains Manufacturer's name or trademark and type or catalog number. Recognized Component marking may be provided. Electrical ratings are optional.

The following statement is also marked on the device or in the instruction manual:

"SUITABLE FOR USE ON A CIRCUIT CAPABLE OF DELIVERING NOT MORE THAN 5,000 RMS SYMMETRICAL AMPERES; 480 V MAXIMUM WHEN PROTECTED BY MAX. 30 A CLASS CC-FUSES".

Spacings - The following spacings are provided throughout these devices -

	Through Air	Over Surface
Between any uninsulated live part and an uninsulated live part of opposite polarity, uninsulated grounded part other than the enclosure, or exposed metal part.	1/4 in (6.35 mm)	3/8 in (9.5 mm)

RELAY TYPE BR01

Assembled

FIG. 1

Disassembled

FIG. 2

General - These devices may be provided as 4NO, 2NO + 2NC, 3NO + 1NC.

1. Housing - R/C (QMFZ2) Bergamid Type A700G30U-SO manufactured by Bergmann Theodor Kunststoffwerk GmbH, rated 95°C. Approx. overall dimensions 53 mm by 28.5 mm by 40 mm, min thickness approx. 0.75 mm at direct support of live parts. Additional supporting ribs molded into housing, two provided each contact. See Ill. 1 and 2 for details. Alternate construction has lowered ribs for soldering, see Fig. 3. See Ill. 3 and 4 for details.

Alternate - Same as above except, Type 66 GF 25 FR 5 A(f2), A SCHULMAN GMBH (rated V0, 130°C) (E86615).

Alternate - Same as above, except Type A3X2G7, BASF SE (E41871), (rated V-0, 115°C).

- * Alternate - Same as above except, R/C (QMFZ2/8.E116324) - Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, CTI 1, RTIel. 115°C, Flame Class V-0.

2. Switching Bridge - R/C (QMFZ2) UP Type UPA 63 manufactured by Rasching GmbH, rated V0, 105°C. Approx. overall dimensions 50 mm by 15.5 mm by 7.5 mm. 0.75 mm min thick.

Alternate - Same as above except, Type "RALUPOL" UP 4385, Raschig GMBH (rated V-0, 170°C) (E75850).

Alternate - Same as above except, R/C (QMFZ2/8.E116324) - Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, CTI 1, RTIel. 115°C, Flame Class V-0.

Alternate - Same as above except, Type Schulamid 66 GF 25 FR 5 A(f2)QMFZ2/8.E86615)manufactured by A SCHULMAN GMBH (rated V-0, 130°C).

3. Stationary Terminal and Contacts - (4 right side and 4 left side provided) Silver plated copper alloy, approx. overall dimensions 21.7 mm by 8.4 mm by 0.8 mm thick. Provided with 3.6 mm dia. contact of same material. Contact measures 0.30 mm thick.
4. Movable Contact Bridge and Contact - (4 provided) Arm made of copper, measures 16.5 mm by 4.4 mm by 0.7 mm thick. Provided with two silver contacts measuring 3 mm by 4 mm by 0.3 mm thick welded to arm.
5. Contact Pressure Spring - (4 provided) Spring steel, measures 6 mm long by 4.4 mm dia. Wire dia. 0.25 mm.
6. Draw Spring - Spring steel, measures 23 mm long by 3.8 mm dia. Wire dia 0.35 mm.
7. Lever - Iron, measures 25.15 mm by 10.5 mm by 3.5 mm, 1. mm thick.

8. Sandwich Plate - R/C (QMFZ2) Bergamid Type A700G30U-SO manufactured by Bergmann Theodor Kunststoffwerk GmbH, rated 95°C. Approx. overall dimensions 51.5 mm by 25.5 mm by 19.5 mm, min. thickness approx. 0.9 mm at direct support of live parts.

Alternate - Same as above except, Type 66 GF 25 FR 5 A(f2), A SCHULMAN GMBH (rated V0, 130°C) (E86615).

Alternate - Same as above, except Type A3X2G7, BASF SE (E41871), (rated V-0, 115°C).

- * Alternate - Same as above except, R/C (QMFZ2/8.E116324) - Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, CTI 1, RTIel. **115°C**, Flame Class V-0.

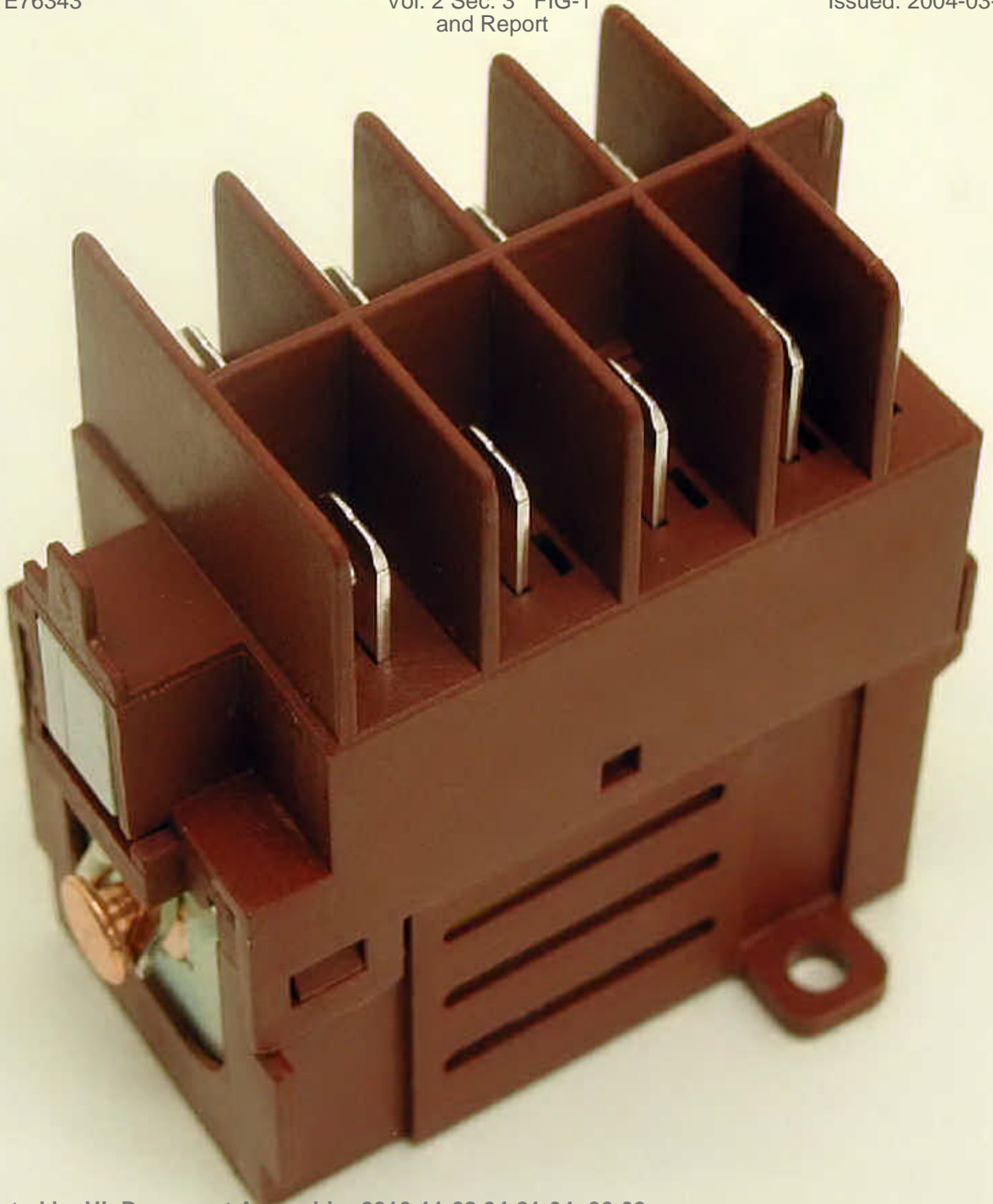
9. Bobbin housing - R/C (QMFZ2) Bergamid Type A700G30U-SO manufactured by Bergmann Theodor Kunststoffwerk GmbH, rated 95°C. Approx. overall dimensions 50.5 mm by 41 mm by 31.5 mm, min. thickness approx. 0.85 mm at direct support of live parts.

Alternate - Same as above except, Type 66 GF 25 FR 5 A(f2), A SCHULMAN GMBH (rated V0, 130°C) (E86615).

Alternate - Same as above, except Type A3X2G7, BASF SE (E41871), (rated V-0, 115°C).

- * Alternate - Same as above except, R/C (QMFZ2/8.E116324) - Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, CTI 1, RTIel. **115°C**, Flame Class V-0.

- *10. Bobbin - R/C Plastic (QMFZ2) Crastin Type SK645FR manufactured by E I Dupont de Nemours & Co INC, rated V0, 125°C. Overall dimensions **approx.** 38.2 mm by 24 mm by 28 mm, **min. thickness approx. 1 mm at direct support of live parts.**
- Alternate - Same as above except, R/C (QMFZ2/8.E45329) - Cat. No. Valox DR48V, manufactured by Sabic Innovative Plastics BV, rated HWI 3, HAI 0, CTI 3, RTIel. 120, Flame Class V-0.**
11. Coil Terminal - Plated copper alloy, 0.8 mm min thick, dimensions 26.6 mm by 6.3 mm. Terminals embedded in coil bobbin and soldered to coil windings.
12. Coil Winding - R/C Magnet Wire (OBMW2) Polysol Type 155 manufactured by Elektrisola. Provided on random wound magnet wire.
- Alternate - Any R/C (OBMW2), magnet wire, ANSI Grade MW75 or MW79, rated minimum 130°C.
13. Coil Banding - R/C Insulating Tape (OANZ2) 10-B manufactured by Kemica S P A rated min 130°C. Wrapped around coil winding.
- Alternate - Any R/C (OANZ2), polyester film insulating tape, rated minimum 125°C.
14. Yoke - Iron, approx. overall dimensions 39.5 mm by 25.2 mm by 25.3 mm. 2.5 mm thick.
15. Core - Soft iron, 10.5/8/6/4.3 mm dia, 13.5 mm long.
16. Short circuit ring - Copper F37, Dimensions 6 mm inside and 7.9 mm outside, 1.5 mm thick.
17. Armature - steel 1.0737 copperplate, overall Dimensions 33.5 mm by 10.5/4/7/8 mm dia.
18. Back Plate - Iron, dimensions 20 mm by 18 mm by 1.5 mm thick, riveted to the armature.



File E76343
bobbin housing

Vol. 2 Sec. 3 FIG-2
and Report

Issued: 2004-03-05
housing

bobbin

yoke

core

short circuit ring

Core

back plate

stationary terminal
and contacts

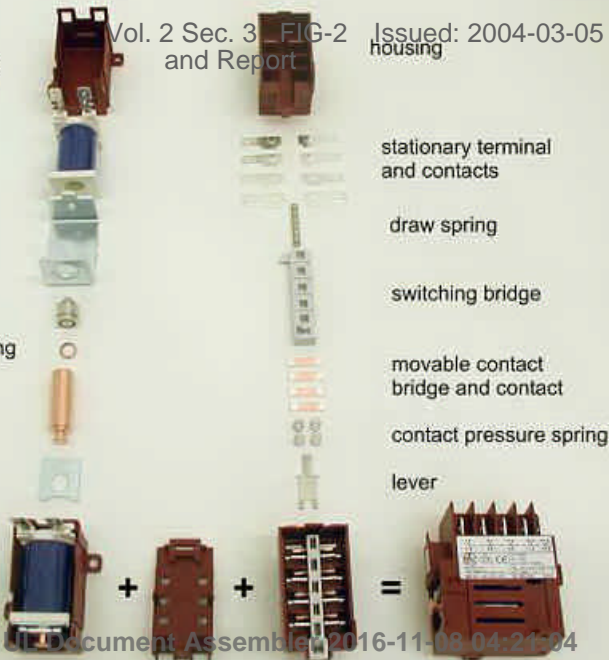
draw spring

switching bridge

movable contact
bridge and contact

contact pressure spring

lever



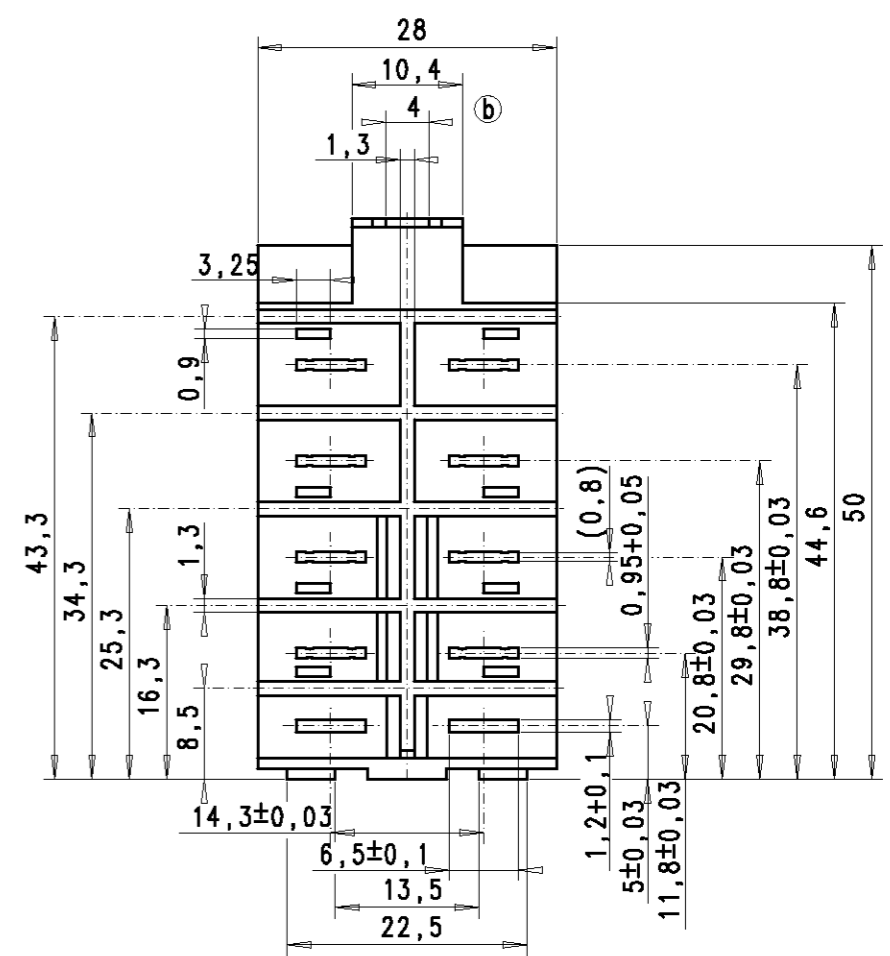
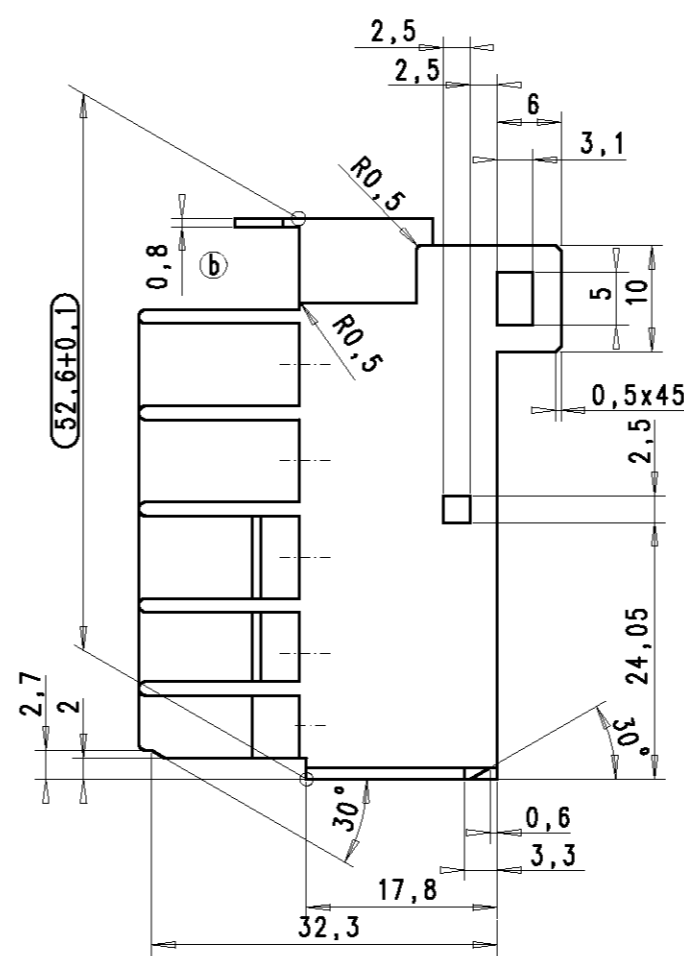
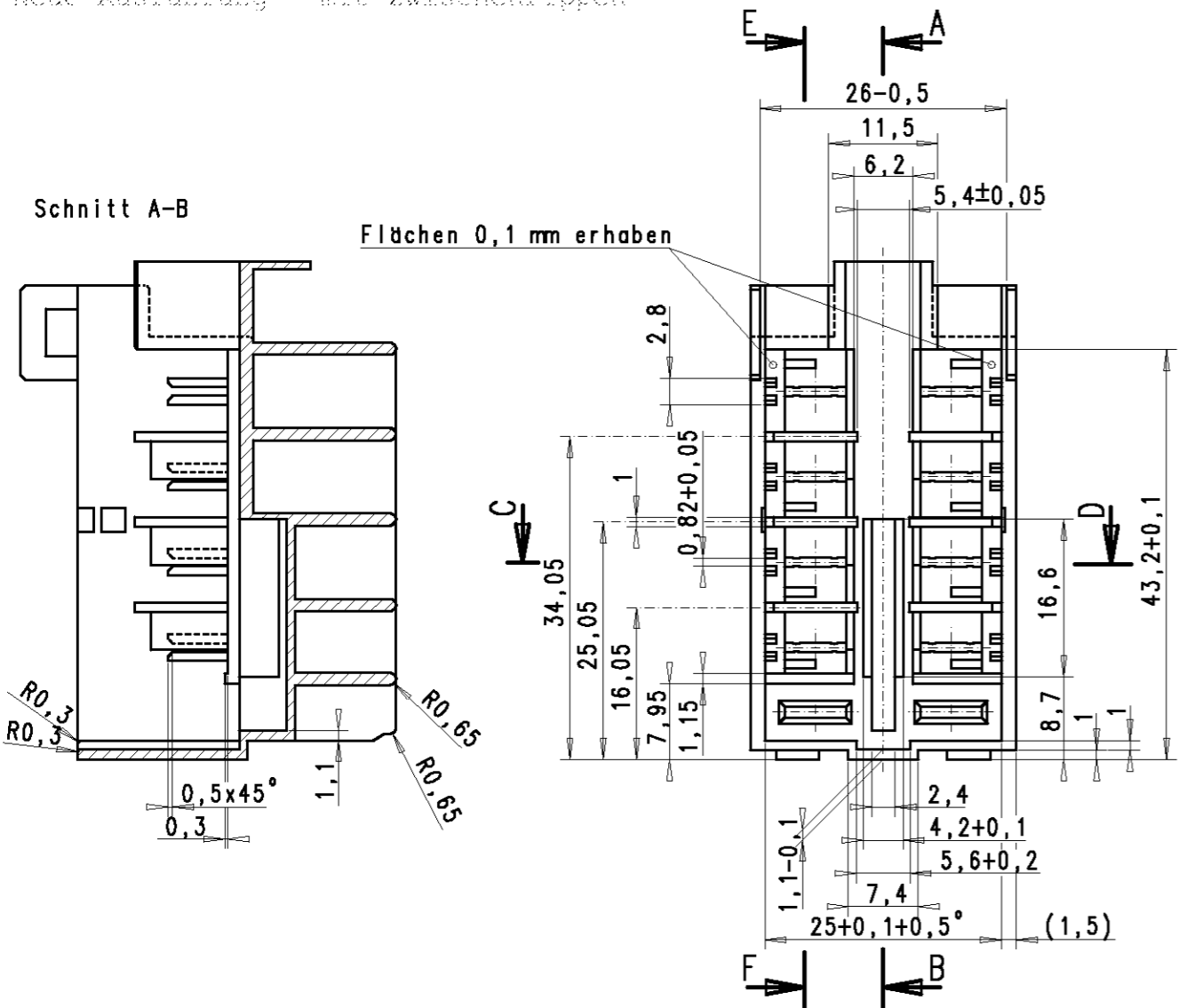
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sandwich plate

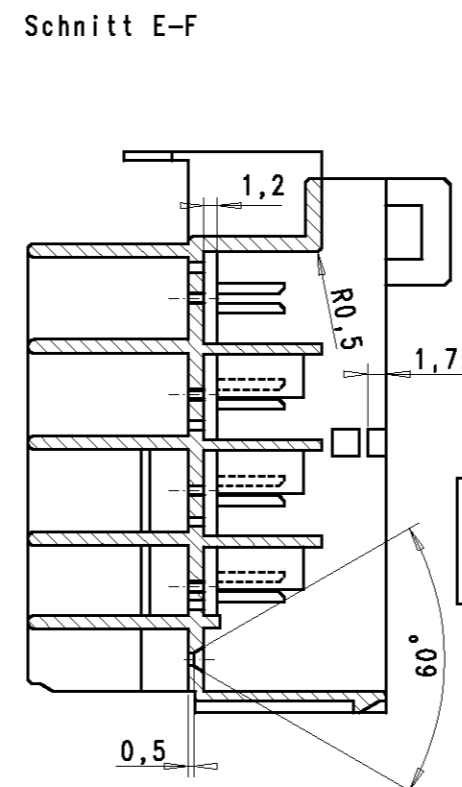
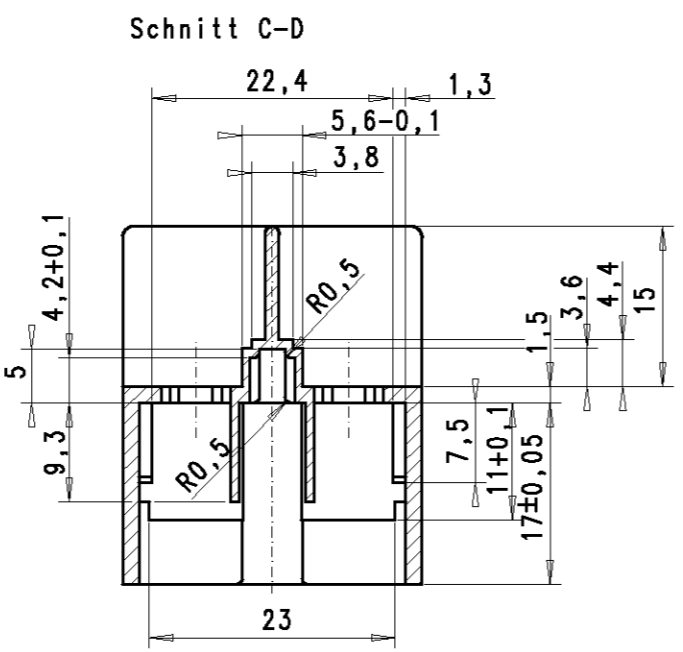
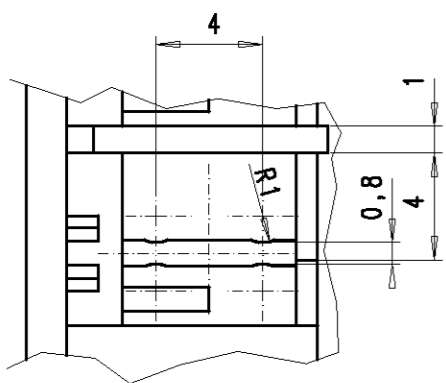
contactor BR01



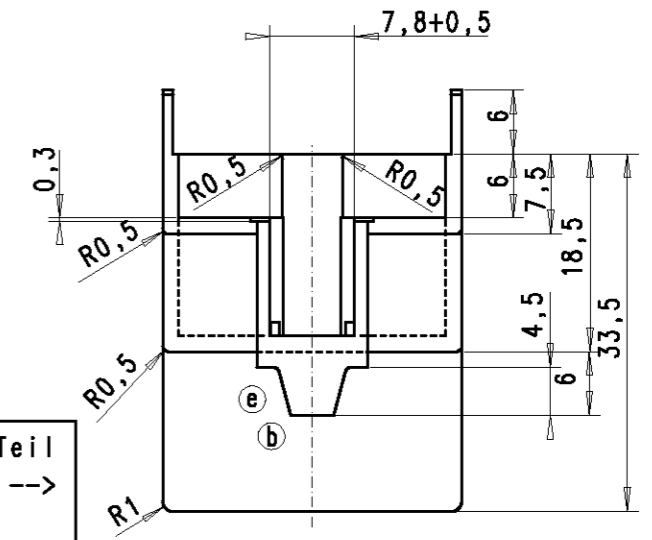
Neue Ausführung - mit Zwischenrippen



Einzelheit Kontaktführung M 5:1



UL-Geprüftes Teil Bei Änderung --> Neuprüfung



Entformungsschräge: 0.5°
Scharfe Außenkanten gerundet mit R0.3

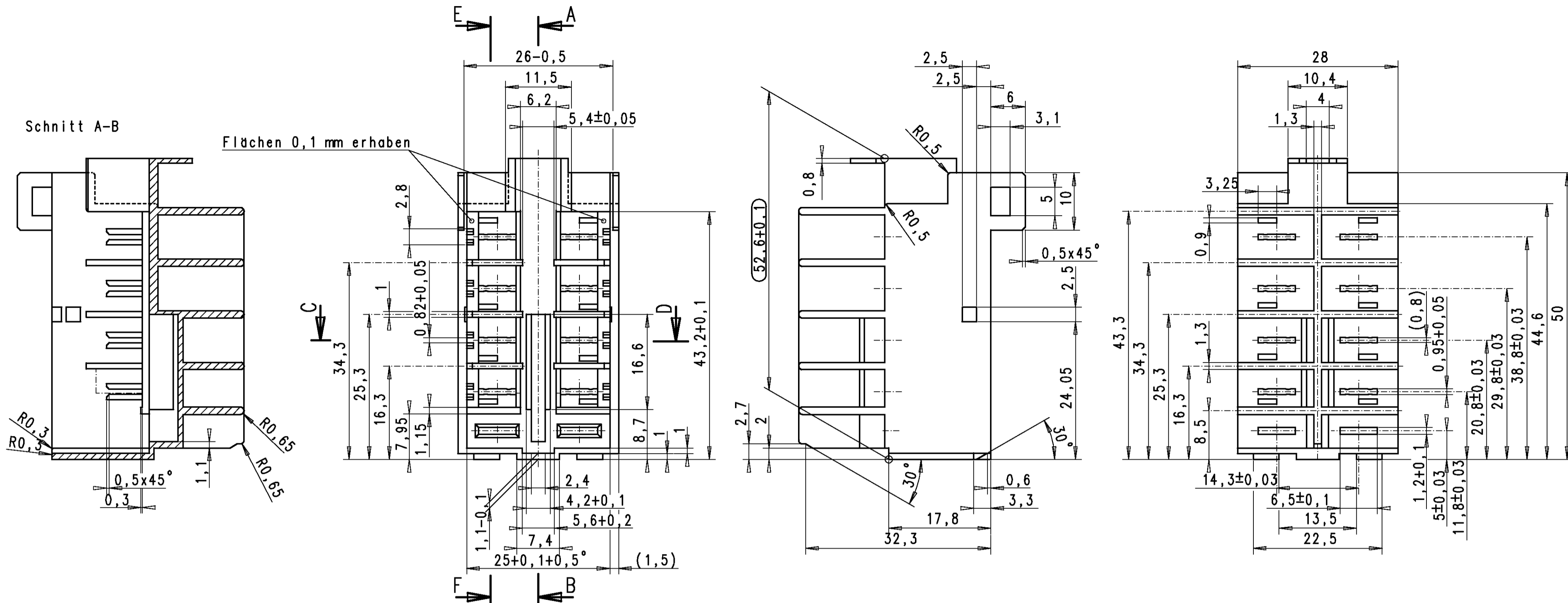
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Kontrollmaß 1 = (52,6±0,1)

Wzg.Nr.: 805.338

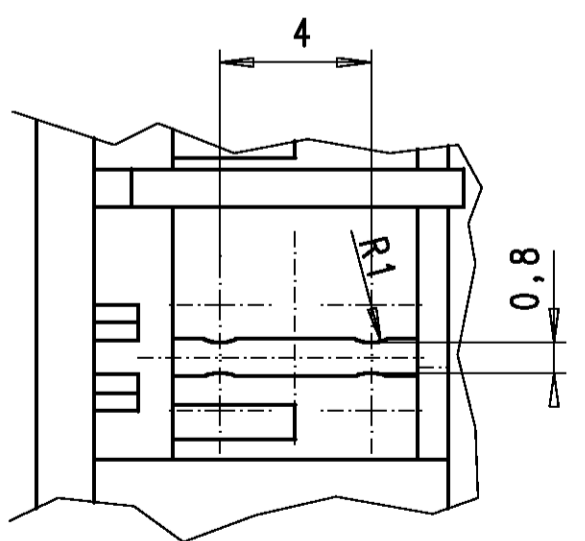
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e	Zeichnung angepasst 15/05/14	Eisenkolb	gez.	30/05	Eisenkolb
d	Mot.-Bez. geänd. 20/02/12	Eisenkolb	gepr.		
c	Prüfhinweis neu 20/02/12	Eisenkolb	Norm		
b	Zeichnung angepasst 09.09.03	Johnson	Schw.:	0.6-1.2%	
a	Teil optimiert 16/09/98	C	Gewicht:	g	
Pos. Änderung		Tag	Name	352.399	

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89347 Günzburg-Bubesheim

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Einzelheit Kontaktführung
M 5:1



Entformungsschräge: 0,5°
Scharfe Außenkanten gerundet mit R0,3

Prüfanweisung:
Kontrollmaß 1 = (52,6±0,1)

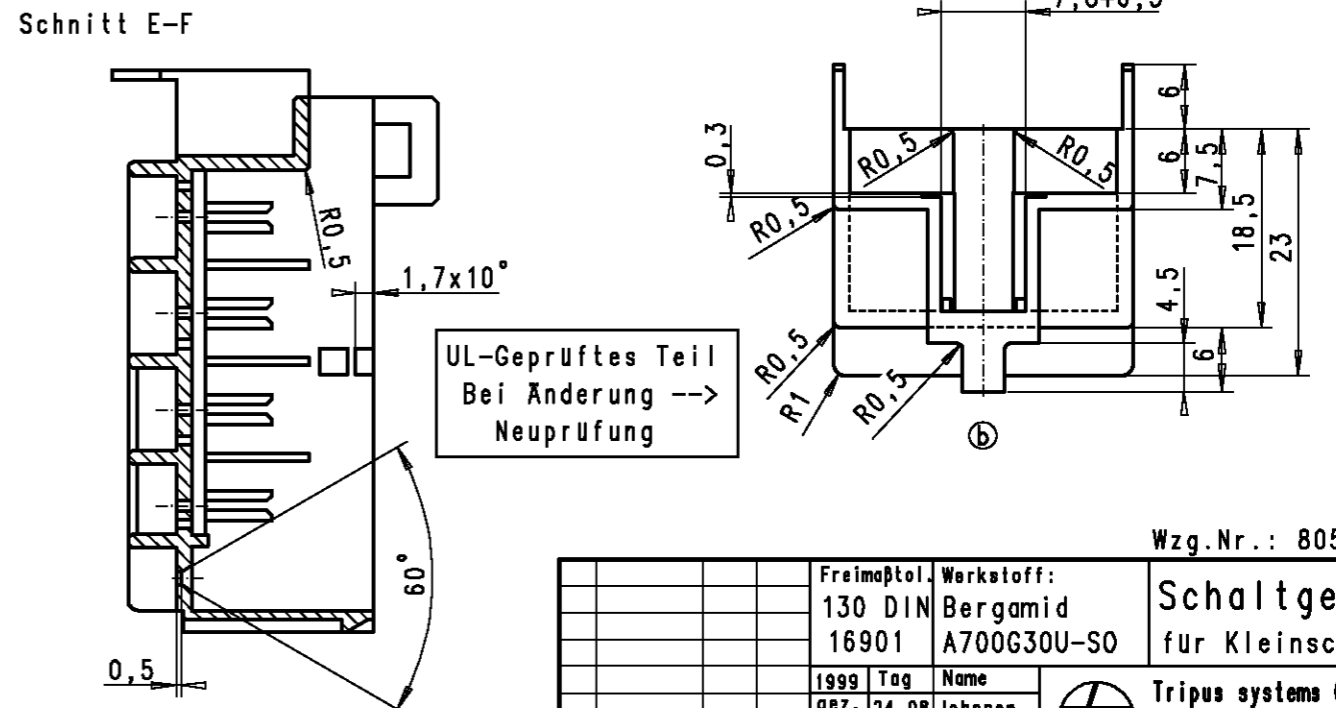
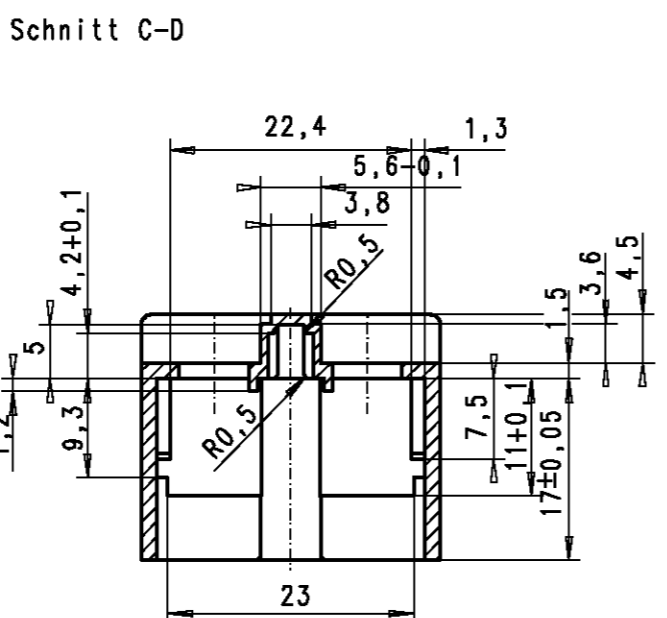
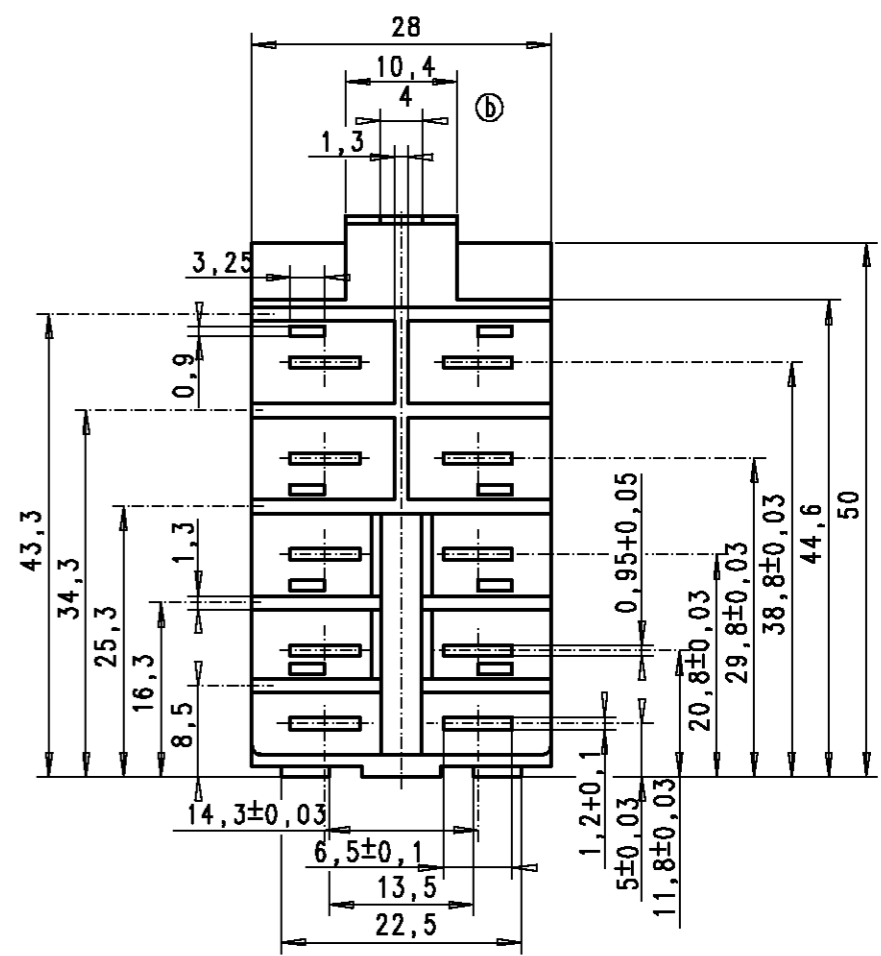
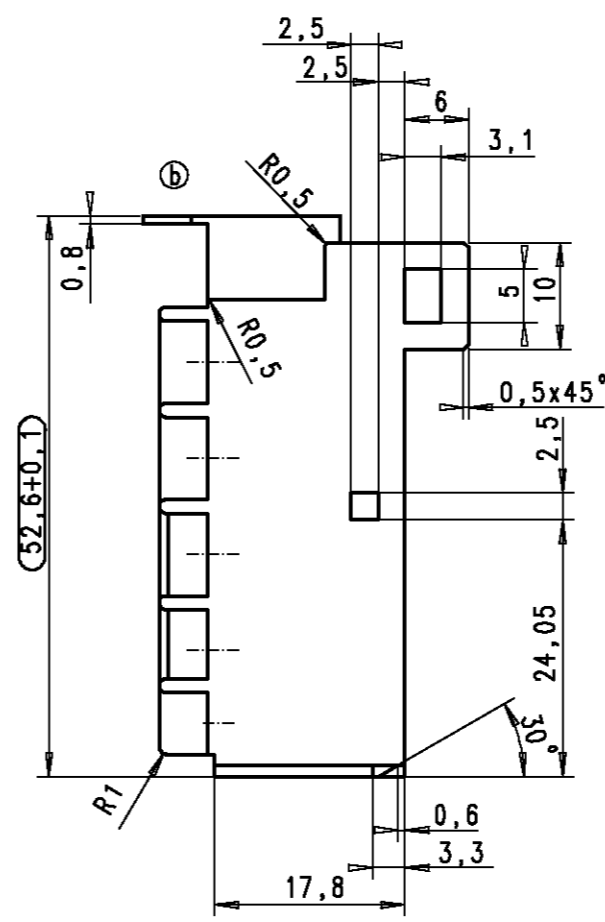
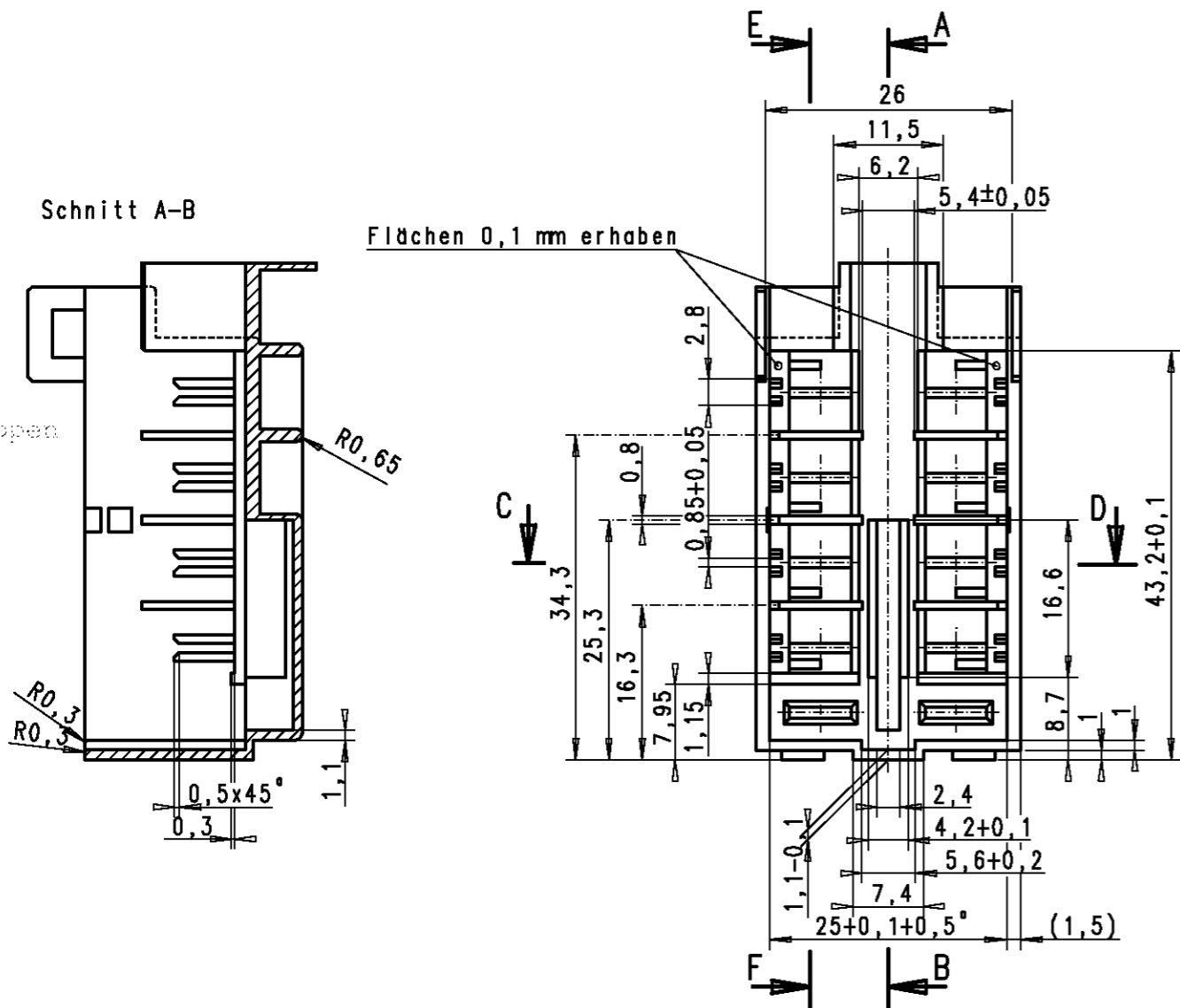
UL-Geprüftes Teil
Bei Änderung -->
Neuprüfung

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DIN 16742		Bergamid		für Kleinschutz 2S20	
- TG5		A700G30U-S0			
2016	Tag	Name		Tripus systems GmbH Schalt- und Steuergeräte 89347 Günzburg-Bubesheim	Maßstab 2:1 A2
gez.	19/05	Eisenloß			
gepr.					
Norm					
Schw.: 0.6-1.2%		353.516			
Gewicht: g					
Pos.	Anderung	Tag	Name		

Wzg.Nr.: 805.338/1

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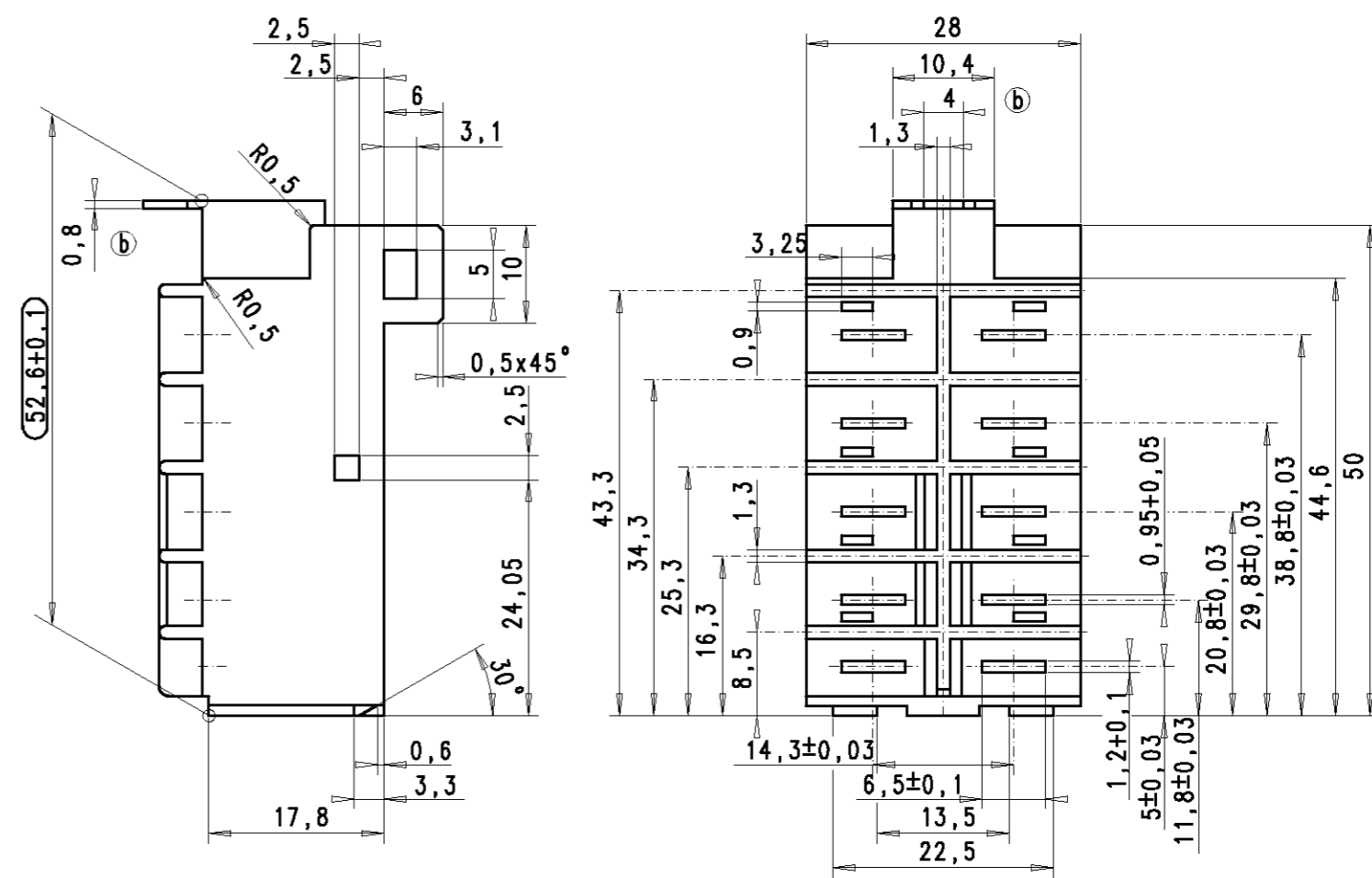
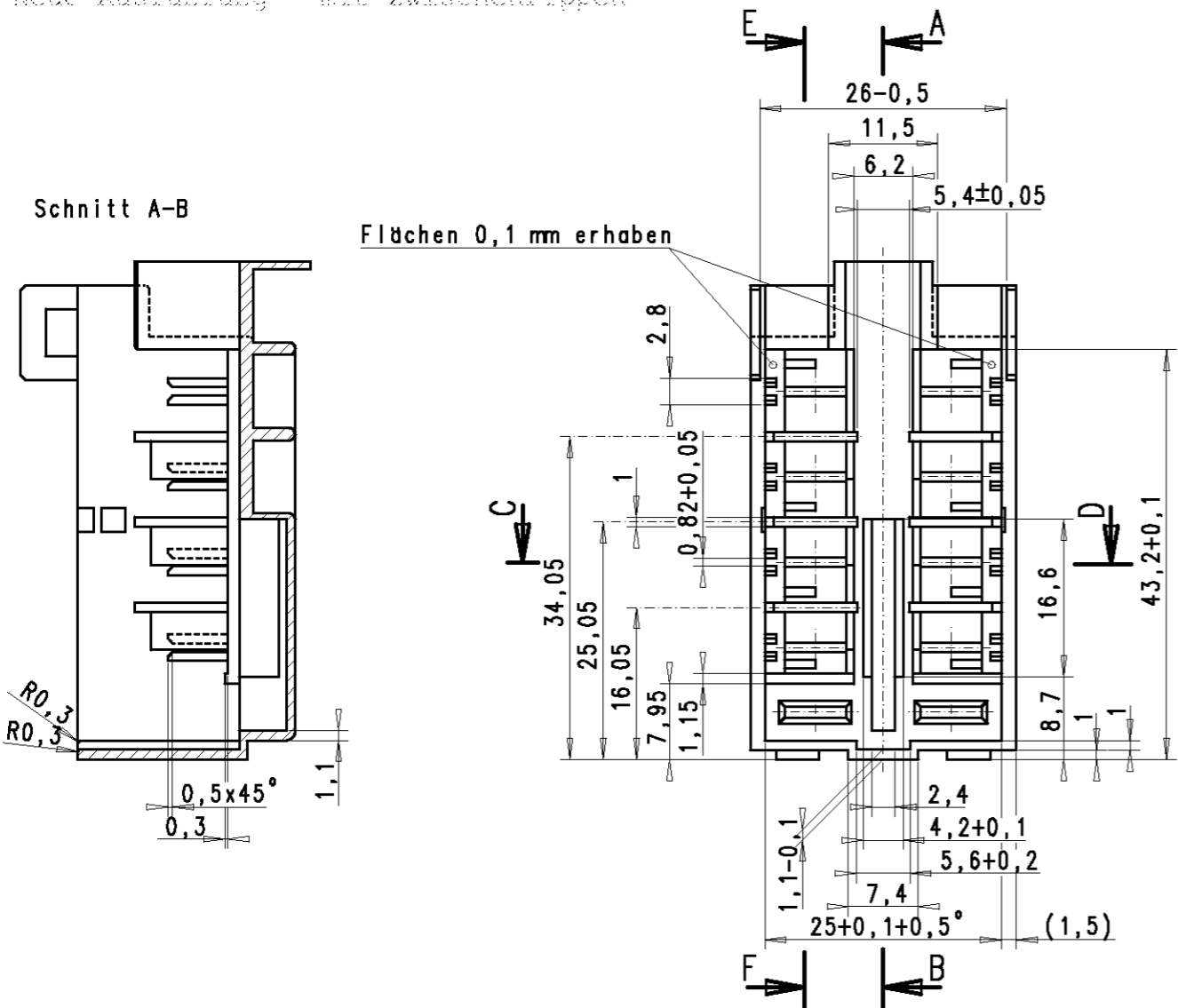
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Scharfe Außenkanten gerundet mit R0.3

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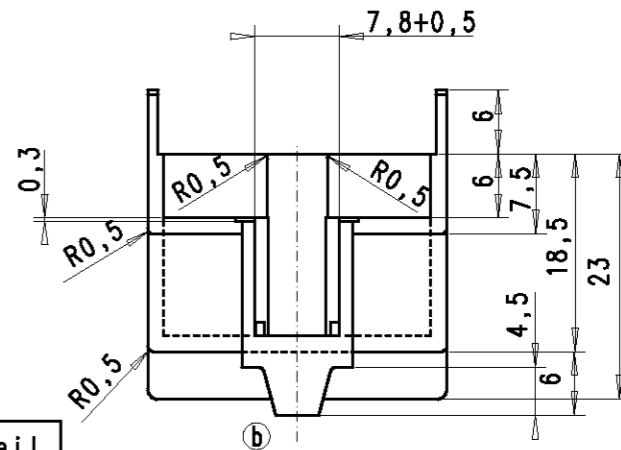
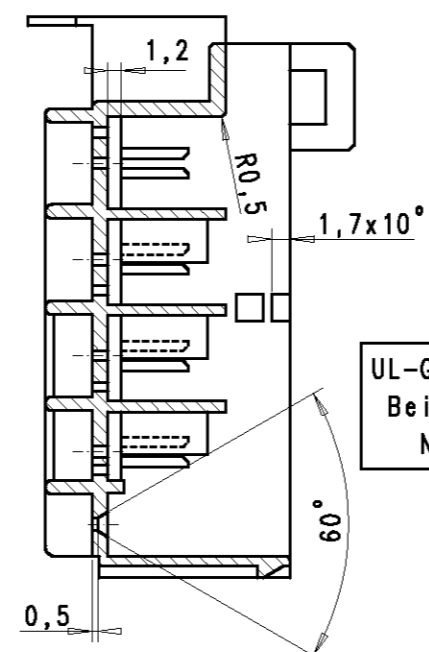
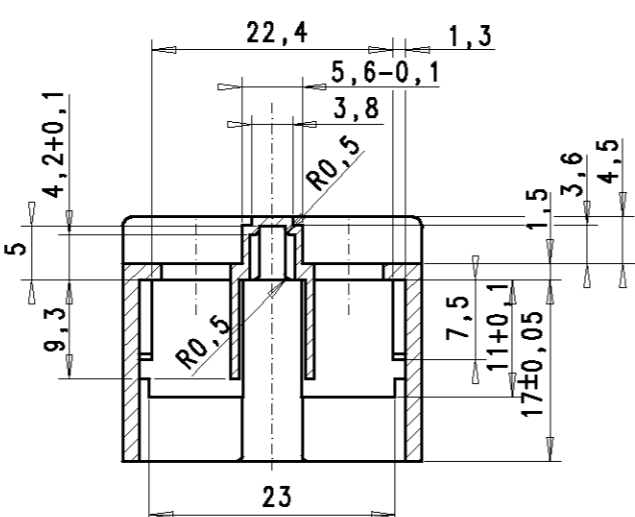
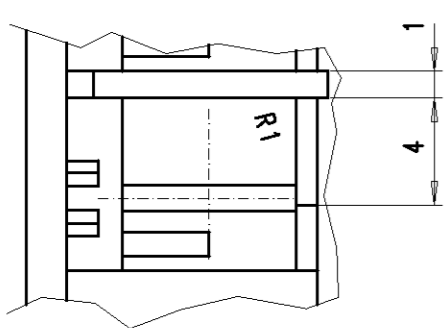
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gez.	24.08	Johnson		
d	Wst.-Bez. geändert	09/03/12	Eisenholl	Maßstab 2:1 A2
c	Prüfhinweis neu	20/02/12	Eisenholl	
b	Teil angepasst	08.09.03	Johnson	353.069
a	Wz.-Nr. richtiggestellt	30.01.02	Johnson	
Poa. Änderung		Tag	Name	Gewicht:

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Neue Ausführung - mit Zwischenrippen



Einzelheit Kontaktführung
M 5:1



UL-Geprüftes Teil
Bei Änderung -->
Neuprüfung

Entformungsschräge: 0.5°
Scharfe Außenkanten gerundet mit R0.3

Prüfanweisung:
Kontrollmaß 1 = (52,6±0,1)

Wzg.Nr.: 805.338/1

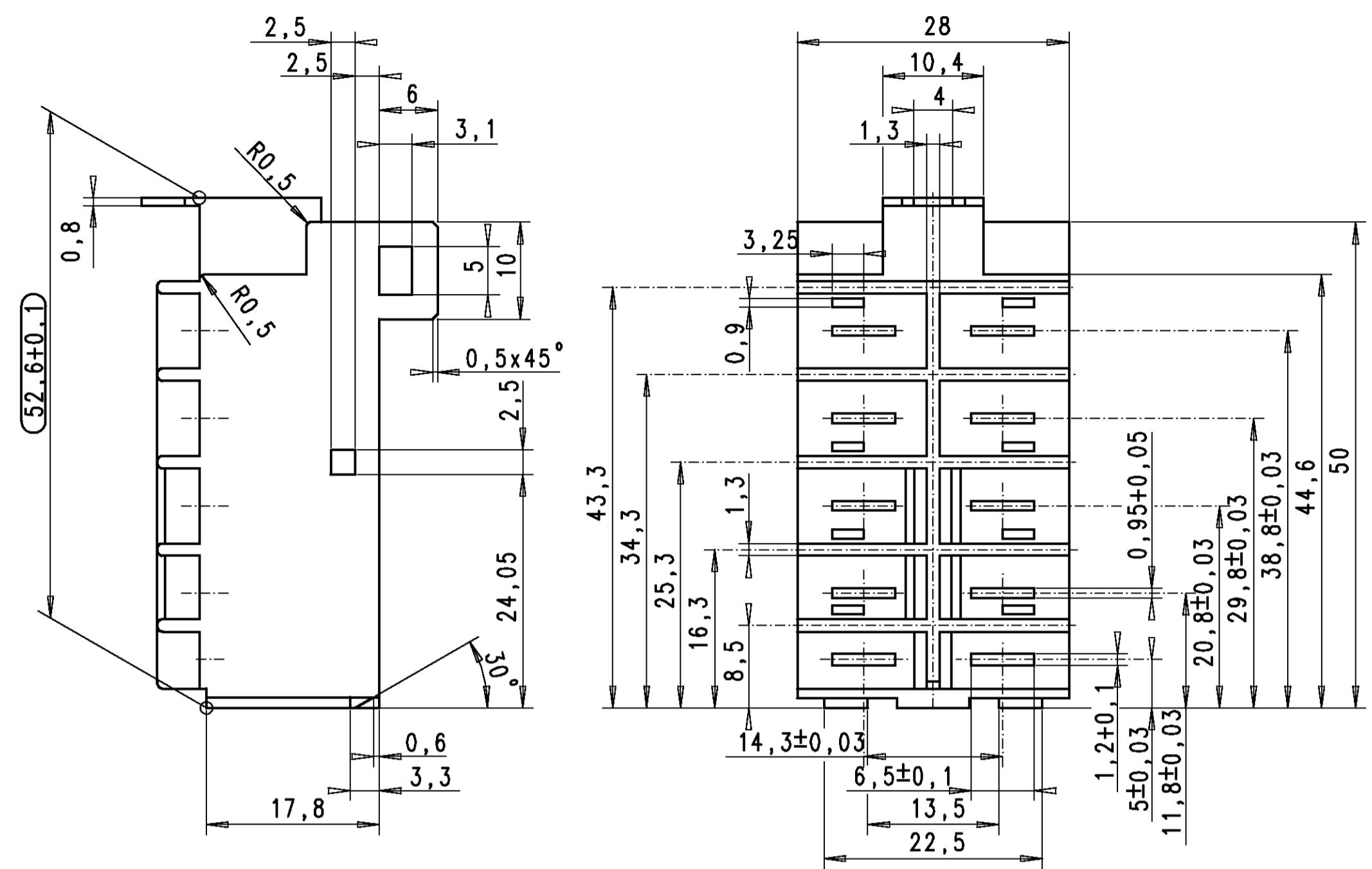
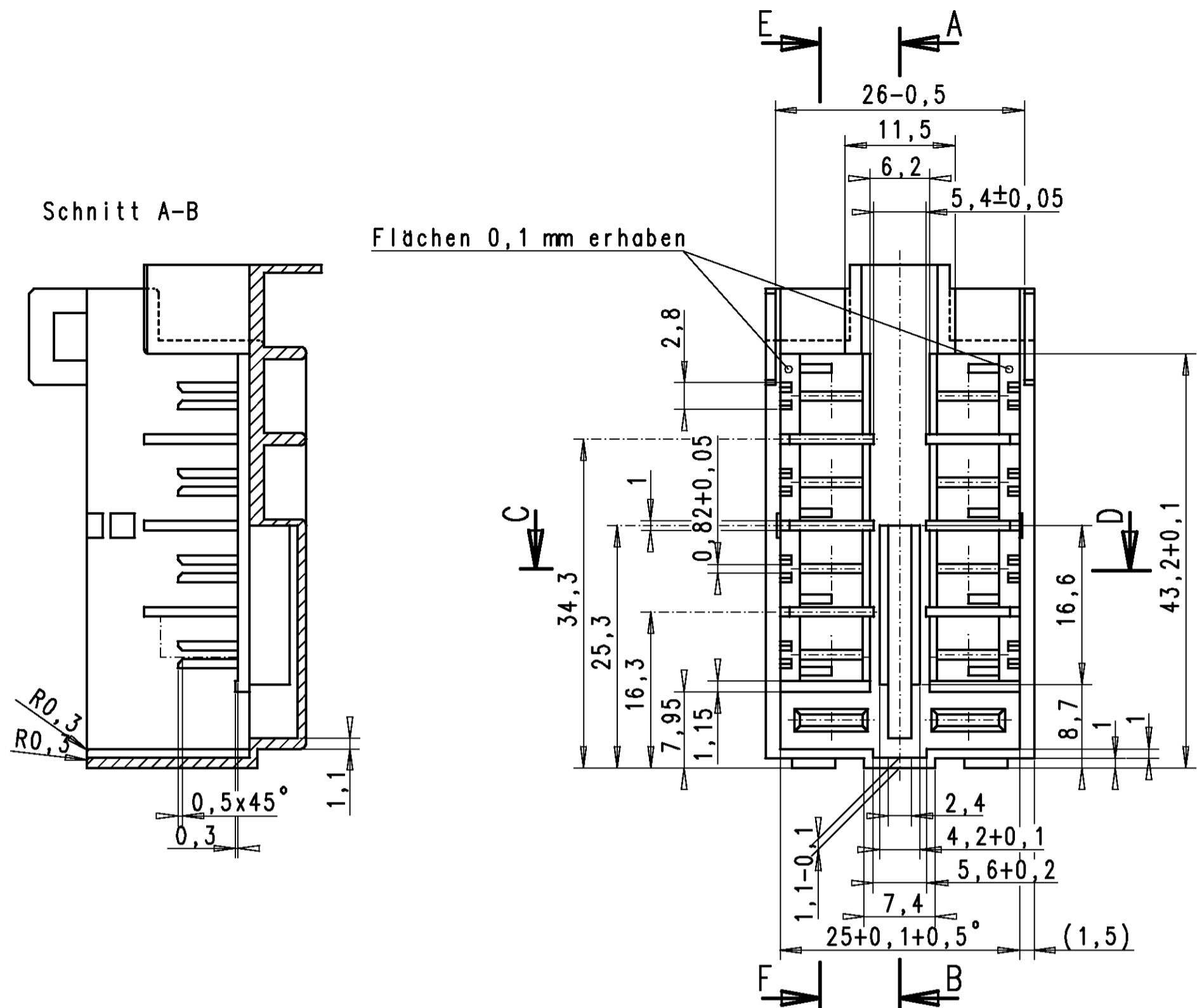
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DIN 16742		Bergamid		für Kleinschutz	
- TC5		A700G30U-S0			
1999	Tag	Name			
e	gez. 24.08	Johnson			
d	gepr.				
c	Norm				
b	Schw.: 0.6-1.2%				
a	Gewicht: g				
Pos. Änderung		Tag Name			

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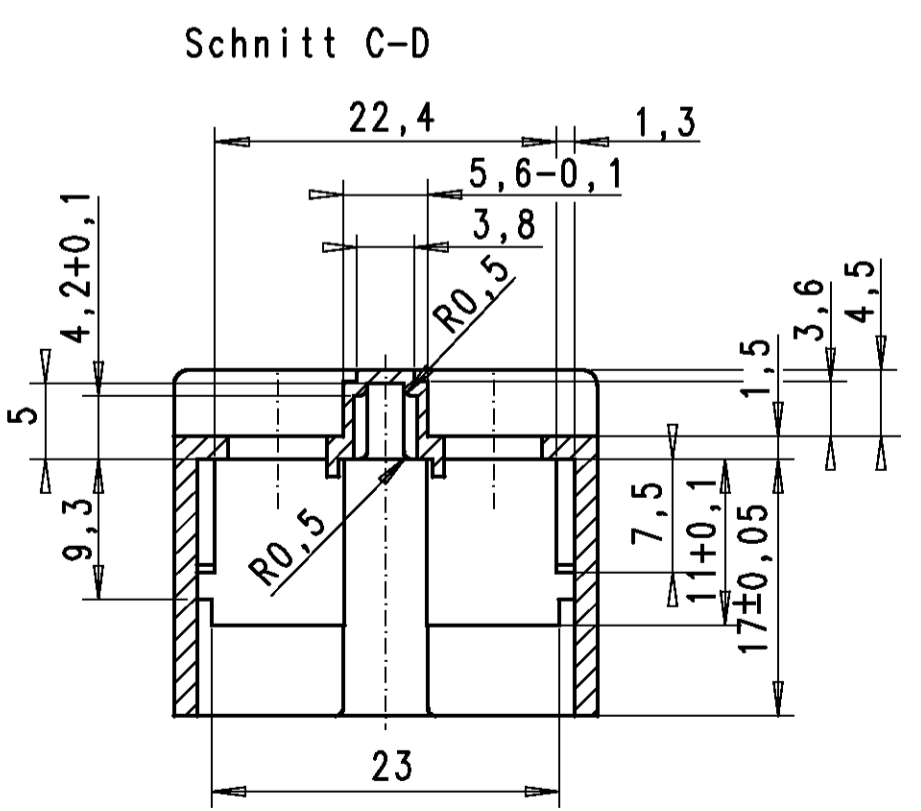
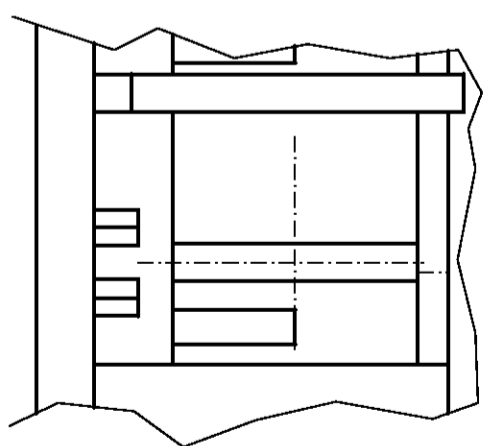
Maßstab
2:1
A2



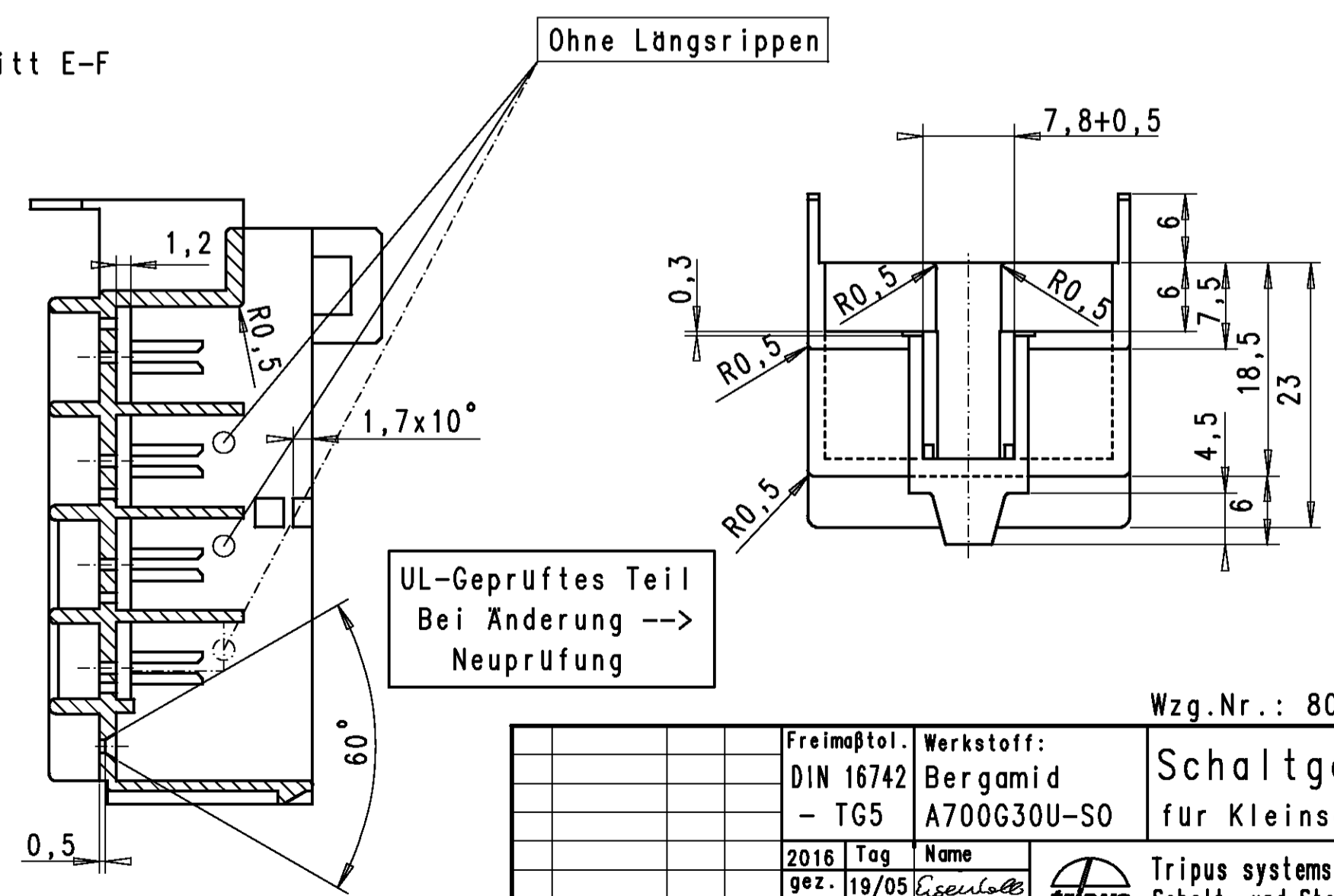
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Einzelheit Kontaktführung
M 5:1



Schnitt E-F



Entformungsschräge: 0,5°
Scharfe Außenkanten gerundet mit R0,3

Prüfanweisung:
Kontrollmaß 1 = (52,6±0,1)

Freimaßtol.		Werkstoff:		Schaltgehäuse	
DIN 16742		Bergamid		für Kleinschutz 2S20	
- TG5		A700G30U-S0			
2016	Tag	Name		Tripus systems GmbH Schalt- und Steuergeräte 89347 Günzburg-Bubesheim	Maßstab 2:1 A2
gez.	19/05	Eisenloß			
gepr.					
Norm					
Schw.: 0.6-1.2%		353.517			
Gewicht: g					
Pos.	Anderung	Tag	Name		

Wzg.Nr.: 805.338/1

Diese Zeichnung dient dem Kunden nur zur unverbindlichen Information!



TEST RECORD NO. 1

SAMPLES:

Representative production samples of Types BR01 described in the preceding section of this report, were submitted by the manufacturer and subjected to a test program as outlined below.

Test results relate only to the items tested.

Some Test were conducted at UL International Germany GmbH, some of the tests were conducted by Prüflaboratorium Bonn located in Bonn under the UL Third Party Test Program. The test data was obtained, reviewed and accepted.

Test Program

conducted at

- Temperature	UL Int. Germany GmbH
- Under/Overvoltage	UL Int. Germany GmbH
- Dielectric Withstand	UL Int. Germany GmbH
- HP-Rating Overload + Endurance	Prüflaboratorium Bonn
- Dielectric	Prüflaboratorium Bonn
- Resistive-Rating Overload + Endurance	UL Int. Germany GmbH
- Dielectric	UL Int. Germany GmbH
- Pilot-Duty-Rating Overload + Endurance	Prüflaboratorium Bonn
- Dielectric	Prüflaboratorium Bonn
- Short Circuit	Prüflaboratorium Bonn

TEMPERATURE TEST:

METHOD

A sample of the device as noted was subjected to the following test. The device was connected to a rated supply and load using 4 ft per terminal of wire size as noted. The device was operated continuously until constant temperatures were reached. Temperatures were measured by thermocouples. The tips of the thermocouples were secured to the heated parts by solder, tape, or sodium silicate.

Model BR01-40-03-01 Voltage 120 V ac
Current, 20 A Wire Size 6 mm²

Enclosure Material: Plastic Size: 80 mm by 80 mm by 105 mm

RESULTS

	Thermocouple Location	Max. Temperature - °C
1.	Coil	123.8
2.	Bobbin	106.4
3.	Lower housing part	99.3
4.	Upper housing part	83.2
5.	Terminal 5	80.4
6.	Terminal A1	68.3
7.	Switching bridge	89.8
8.	Ambient in enclosure	62.4
9.	Ambient around enclosure	23

The following coil is to be measured by the change-in-resistance method.

	1	2	3
Model	BR01-40-03-01	BR01-40-08-01	BR01-40-01-01
	1	2	3
Coil resistance cold (r)	370 ohms	16.41 ohms	2057 ohms
Coil resistance hot (R)	534 ohms	22.17 ohms	2871 ohms
Ambient air, coil cold (t1)	22 °C	22 °C	22 °C
Ambient air, coil hot (t2)	63 °C	63 °C	63 °C
Coil temperature, rise	72.7 °C	49 °C	60.5 °C
Time in seconds after coil shut down	Measured Resistance	Measured Resistance	Measured Resistance
	BR01-40-03-01	BR01-40-08-01	BR01-40-01-01
10	530 ohms	22.14 ohms	2867 ohms
20	520 ohms	22.14 ohms	2863 ohms
30	520 ohms	22.12 ohms	2859 ohms
40	520 ohms	22.09 ohms	2855 ohms
50	520 ohms	22.07 ohms	2850 ohms
60	510 ohms	22.05 ohms	2846 ohms
70	510 ohms	22.03 ohms	2842 ohms
80	510 ohms	22.01 ohms	2838 ohms
90	510 ohms	21.99 ohms	2835 ohms

Temp rise - $(R / r) * [k + t1] - [k + t2]$

R is the resistance of the coil at the end of the test in ohms
 r is the resistance of the coil at the beginning of the test in ohms
 t1 is the ambient temperature in degrees C at the beginning of the test
 t2 is the ambient temperature in degrees C at the end of the test
 k is 234.5 for copper conductor, 225.0 for electrical conductor grade (EC) aluminum; values of the constant for other conductors are to be determined.

DIELECTRIC WITHSTAND TEST: MODEL BR01-40-03-01

METHOD

To be tested in accordance with Section 49 of UL 508 (Industrial Control Equipment Standard) Seventeenth Edition.

	VOLTS AC	RESULTS
SWITCH OPEN - LIVE PARTS TO ARMATURE	1480	NB
SWITCH OPEN - LIVE PARTS OPPOSITE POLARITY	1480	NB
UNINSULATED LIVE PARTS OF DIFFERENT CIRCUITS	1480	NB

REMARKS: NB - No Breakdown

DIELECTRIC WITHSTAND TEST: MODEL BR01-40-08-01

METHOD

To be tested in accordance with Section 49 of UL 508 (Industrial Control Equipment Standard) Seventeenth Edition.

	VOLTS AC	RESULTS
SWITCH OPEN - LIVE PARTS TO ARMATURE	1480	NB
SWITCH OPEN - LIVE PARTS OPPOSITE POLARITY	1480	NB
UNINSULATED LIVE PARTS OF DIFFERENT CIRCUITS	1480	NB

REMARKS: NB - No Breakdown

DIELECTRIC WITHSTAND TEST: MODEL BR01-40-01-01

METHOD

To be tested in accordance with Section 49 of UL 508 (Industrial Control Equipment Standard) Seventeenth Edition.

	VOLTS AC	RESULTS
SWITCH OPEN - LIVE PARTS TO ARMATURE	1480	NB
SWITCH OPEN - LIVE PARTS OPPOSITE POLARITY	1480	NB
UNINSULATED LIVE PARTS OF DIFFERENT CIRCUITS	1480	NB

REMARKS: NB - No Breakdown

TEMPERATURE TEST:

METHOD

A sample of the device as noted was subjected to the following test. The device was connected to a rated supply and load using 4 ft per terminal of wire size as noted. The device was operated continuously until constant temperatures were reached. Temperatures were measured by thermocouples. The tips of the thermocouples were secured to the heated parts by solder, tape, or sodium silicate.

Model BR01-40-03-01 Voltage 120 V ac
Current, 20 A Wire Size 6 mm²

Enclosure Material: no Enclosure Size: -

RESULTS

	Thermocouple Location	Max. Temperature - °C
1.	Coil	103.9
2.	Bobbin	95.0
3.	Lower housing part	87.6
4.	Upper housing part	70.1
5.	Terminal 5	68.2
6.	Terminal A1	57.2
7.	Switching bridge	76.3
8.	Ambient	40.1

The following coil is to be measured by the change-in-resistance method:

Model No. BR01-40-03-01

Coil resistance cold	(r) 400 ohms
Coil resistance hot	(R) 518.2 ohms
Ambient air, coil cold	(t1) 40 °C
Ambient air, coil hot	(t2) 40.1°C
Coil temperature, rise	81 °C

Time in seconds after coil shut down	Measured Resistance in ohms
10	516.6
20	515.5
30	514.4
40	512.9
50	511.6
60	510.1
70	508.8
80	507.5
90	506.3

Temp rise = $(R / r) * [k + t1] - [k + t2]$

R is the resistance of the coil at the end of the test in ohms
r is the resistance of the coil at the beginning of the test in ohms
t1 is the room temperature in degrees C at the beginning of the test
t2 is the room temperature in degrees C at the end of the test
k is 234.5 for copper conductor, 225.0 for electrical conductor grade (EC)
aluminum; values of the constant for other conductors are to be determined.

OVER/UNDERVOLTAGE TEST:

METHOD

A sample of each device whose model numbers are tabulated below was energized at the rated voltage until constant temperatures were observed. The (coil) voltage was then reduced to the indicated undervoltage and the device was opened and closed several times. The (coil) voltage was then increased to the overvoltage indicated until the temperatures stabilized. The voltage was then rapidly reduced to the rated voltage and the device was opened and closed several times.

Model No.	Rated Voltage	Undervoltage	Overvoltage
BR01-40-03-01	115 V ac	102 V ac	132 V ac
BR01-40-08-01	24 V ac	20.4 V ac	26.4 V ac
BR01-40-01-01	230 V ac	204 V ac	264 V ac

RESULTS

The device operated continuously without apparent damage (to the operating coil) at the overvoltage and operated acceptably at the undervoltage.

OVERLOAD AND ENDURANCE TEST:

Conducted in accordance with Sections 45 and 46 of the Industrial Control Standard (UL 508), Seventeenth Edition.

Test	O' LOAD-ST. ROTOR- ENDURANCE	OVERLOAD	ENDURANCE
	CAT. NO.	BR01-40-01-01	BR01-40-01-01
	POLES USED	1NO	1NO
	BOX CONNECTION TO WHICH POLE	-	-
FOR	AMPERES	20	20
RATINGS	VOLTS	120	120
OF	HORSEPOWER/WATTS	-	-
	PHASE/DC	1	1
TEST	VOLTS-OPEN CCT	130.9	127
DATA	VOLTS-CLOSED CCT	120	120
	PHASE/DC	1	1
	AMPERES	30	20
	POWER FACTOR	Resistive	Resisitve
	SHUNT OHMS/PHASE	4	6
	OPERATIONS/MIN	6	60
	TOTAL OPERATIONS	50	6000
	RESULTS	ACC	ACC

DIELECTRIC WITHSTAND TEST:

METHOD

To be tested in accordance with Section 49 of UL 508 (Industrial Control Equipment Standard) Seventeenth Edition.

	VOLTS AC	RESULTS
SWITCH OPEN - LIVE PARTS TO ENCLOSURE	1480	NB
UNINSULATED LIVE PARTS OF DIFFERENT CIRCUITS	1480	NB

REMARKS: NB - No Breakdown

OVERLOAD AND ENDURANCE TEST:

Conducted in accordance with Sections 45 and 46 of the Industrial Control Standard (UL 508), Seventeenth Edition.

Test	O' LOAD-ST. ROTOR- ENDURANCE	OVERLOAD	ENDURANCE	ENDURANCE
	CAT. NO.	BR01-40-01-01	BR01-40-01-01	BR01-40-01-01
	POLES USED	3NO	3NO	3NO
	BOX CONNECTION TO WHICH POLE			
FOR	AMPERES	-	-	-
RATINGS	VOLTS	240	240	240
OF	HORSEPOWER	3 / 5 hp	3 / 5 HP	3 / 5 HP
	PHASE	1 / 3	1 / 3	1 / 3
TEST	VOLTS-OPEN CCT	257	247	247
DATA	VOLTS-CLOSED CCT	247	243	241
	PHASE	3	3	3
	AMPERES	103	35.4	17.7
	POWER FACTOR	0.40-0.46PF	0.45	0.42
	SHUNT OHMS/PHASE	270.4	700	1541
	OPERATIONS/MIN	6	60	6
	TOTAL OPERATIONS	50	1000	5000
	RESULTS	ACC	ACC	ACC

DIELECTRIC WITHSTAND TEST:

METHOD

To be tested in accordance with Section 49 of UL 508 (Industrial Control Equipment Standard) Seventeenth Edition.

	VOLTS AC	RESULTS
SWITCH OPEN - LIVE PARTS TO ENCLOSURE	1480	NB
SWITCH CLOSED - LIVE PARTS TO ENCLOSURE	1480	NB
BETWEEN TERMINALS OF OPPOSITE POLARITY	1480	NB
UNINSULATED LIVE PARTS OF DIFFERENT CIRCUITS	1480	NB

REMARKS: NB - No Breakdown

OVERLOAD AND ENDURANCE TEST (AC PILOT DUTY) (Section 137 + 138 of UL508, 17th edition, dated January 28, 1999):

METHOD

A new set of contacts was each connected subsequently to the loads described below. For the Overload tests, the voltage was increased to 110 percent and the device was operated 50 times at a rate of 1 second on and 9 seconds off.

For the Endurance Test, each contact was operated for the first ten operations as fast as possible, the next 990 operations at a rate of 1 per second, and the remaining 5,000 operations at a rate of 6 per minute.

	Overload		Endurance	
	RATED	ACTUAL	RATED	ACTUAL
Cat. No.	BR01-22-01-01			
Wire size, AWG No. or MCM		12		12
Test based on rating of - Interrupting poles	1 NO	1 NO	1 NO	1 NO
Phase	1	1	1	1
Frequency, Hz	50	50	50	50
Load Resistance Ohms		5680		5680
Power Factor		0.33/0.32		0.33/0.32
V	120	120	120	120
Open-circuit voltage		143/143		130/130
Closed-circuit voltage		135/139		123/127
Current make/break, A	60/6	67.5/6.9	60/6	61.4/6.28
Percent of rated current	110	113/115	100	102/104
Number of test operations	50	50	6000 (+)	6000 (+)
Time on, sec (FWD/REV)	1	1	1 (0.5) (+)	1 (0.5) (+)
Time off, sec	9	9	9 (0.5) (+)	9 (0.5) (+)
Did 30 A Ground Fuse Open?	-	No	-	No
Results	-	ACC	-	ACC

REMARKS:

ACC - Acceptable

+ 1000 cycles with 60 operations per minute except the first 10 operations are made as rapidly as possible. Values in brackets are the time values for the 1000 cycles.

DIELECTRIC WITHSTAND TEST:

METHOD

To be tested in accordance with Section 49 of UL 508 (Industrial Control Equipment Standard) Seventeenth Edition.

	VOLTS AC	RESULTS
SWITCH OPEN - LIVE PARTS TO ENCLOSURE	1480	NB
SWITCH CLOSED - LIVE PARTS TO ENCLOSURE	1480	NB
BETWEEN TERMINALS OF OPPOSITE POLARITY	1480	NB
UNINSULATED LIVE PARTS OF DIFFERENT CIRCUITS	1480	NB

REMARKS: NB - No Breakdown

OVERLOAD AND ENDURANCE TEST (DC PILOT DUTY) (Section 137 + 138 of UL508, 17th edition, dated January 28, 1999):

METHOD

A new set of contacts was each connected subsequently to the loads described below. For the Overload tests, the voltage was increased to 110 percent and the device was operated 50 times at a rate of 1 second on and 9 seconds off.

For the Endurance Test, each contact was operated for the first ten operations as fast as possible, the next 990 operations at a rate of 1 per second, and the remaining 5,000 operations at a rate of 6 per minute.

	Overload		Endurance	
	RATED	ACTUAL	RATED	ACTUAL
Cat. No.	BR01-22-01-01			
Wire size, AWG No. or MCM		12		12
Test based on rating of - Interrupting poles	1 NC	1 NC	1 NC	1 NC
Phase	1	1	1	1
Frequency, Hz	50	50	50	50
Load Resistance Ohms		5680		5680
Power Factor		0.33/0.32		0.33/0.32
V	120	120	120	120
Open-circuit voltage		143/143		130/130
Closed-circuit voltage		135/139		123/127
Current make/break, A	60/6	67.5/6.9	60/6	61.4/6.28
Percent of rated current	110	113/115	100	102/104
Number of test operations	50	50	6000 (+)	6000 (+)
Time on, sec (FWD/REV)	1	1	1 (0.5) (+)	1 (0.5) (+)
Time off, sec	9	9	9 (0.5) (+)	9 (0.5) (+)
Did 30 A Ground Fuse Open?	-	No	-	No
Results	-	ACC	-	ACC

REMARKS:

ACC - Acceptable

+ 1000 cycles with 60 operations per minute except the first 10 operations are made as rapidly as possible. Values in brackets are the time values for the 1000 cycles.

DIELECTRIC WITHSTAND TEST:

METHOD

To be tested in accordance with Section 49 of UL 508 (Industrial Control Equipment Standard) Seventeenth Edition.

	VOLTS AC	RESULTS
SWITCH OPEN - LIVE PARTS TO ENCLOSURE	1480	NB
SWITCH CLOSED - LIVE PARTS TO ENCLOSURE	1480	NB
BETWEEN TERMINALS OF OPPOSITE POLARITY	1480	NB
UNINSULATED LIVE PARTS OF DIFFERENT CIRCUITS	1480	NB

REMARKS: NB - No Breakdown

OVERLOAD AND ENDURANCE TEST (DC PILOT DUTY) (Section 137 + 138 of UL508, 17th edition, dated January 28, 1999):

METHOD

A new set of contacts was each connected subsequently to the loads described below. For the Overload tests, the voltage was increased to 110 percent and the device was operated 50 times at a rate of 1 second on and 9 seconds off.

For the Endurance Test, each contact was operated for the first ten operations as fast as possible, the next 990 operations at a rate of 1 per second, and the remaining 5,000 operations at a rate of 6 per minute.

	Overload		Endurance	
	RATED	ACTUAL	RATED	ACTUAL
Cat. No.	BR01-22-01-01			
Wire size, AWG No. or MCM		12		12
Test based on rating of - Interrupting poles	1 NO	1 NO	1 NO	1 NO
Phase	1	1	1	1
Frequency, Hz	50	50	50	50
Load Resistance Ohms		23200		23200
Power Factor		0.34/0.32		0.34/0.32
V	240	240	240	240
Open-circuit voltage		280//280		255/255
Closed-circuit voltage		270/280		246/255
Current make/break, A	30/3	33.1/3.4	30/3	30.1/3.08
Percent of rated current	110	110/113	100	100/100
Number of test operations	50	50	6000 (+)	6000 (+)
Time on, sec (FWD/REV)	1	1	1 (0.5) (+)	1 (0.5) (+)
Time off, sec	9	9	9 (0.5) (+)	9 (0.5) (+)
Did 30 A Ground Fuse Open?	-	No	-	No
Results	-	ACC	-	ACC

REMARKS:

ACC - Acceptable

+ 1000 cycles with 60 operations per minute except the first 10 operations are made as rapidly as possible. Values in brackets are the time values for the 1000 cycles.

DIELECTRIC WITHSTAND TEST:

METHOD

To be tested in accordance with Section 49 of UL 508 (Industrial Control Equipment Standard) Seventeenth Edition.

	VOLTS AC	RESULTS
SWITCH OPEN - LIVE PARTS TO ENCLOSURE	1480	NB
SWITCH CLOSED - LIVE PARTS TO ENCLOSURE	1480	NB
BETWEEN TERMINALS OF OPPOSITE POLARITY	1480	NB
UNINSULATED LIVE PARTS OF DIFFERENT CIRCUITS	1480	NB

REMARKS: NB - No Breakdown

OVERLOAD AND ENDURANCE TEST (DC PILOT DUTY) (Section 137 + 138 of UL508, 17th edition, dated January 28, 1999):

METHOD

A new set of contacts was each connected subsequently to the loads described below. For the Overload tests, the voltage was increased to 110 percent and the device was operated 50 times at a rate of 1 second on and 9 seconds off.

For the Endurance Test, each contact was operated for the first ten operations as fast as possible, the next 990 operations at a rate of 1 per second, and the remaining 5,000 operations at a rate of 6 per minute.

	Overload		Endurance	
	RATED	ACTUAL	RATED	ACTUAL
Cat. No.	BR01-22-01-01			
Wire size, AWG No. or MCM		12		12
Test based on rating of - Interrupting poles	1 NC	1 NC	1 NC	1 NC
Phase	1	1	1	1
Frequency, Hz	50	50	50	50
Load Resistance Ohms		23200		23200
Power Factor		0.34/0.32		0.34/0.32
V	240	240	240	240
Open-circuit voltage		280//280		255/255
Closed-circuit voltage		270/280		246/255
Current make/break, A	30/3	33.1/3.4	30/3	30.1/3.08
Percent of rated current	110	110/113	100	100/100
Number of test operations	50	50	6000 (+)	6000 (+)
Time on, sec (FWD/REV)	1	1	1 (0.5) (+)	1 (0.5) (+)
Time off, sec	9	9	9 (0.5) (+)	9 (0.5) (+)
Did 30 A Ground Fuse Open?	-	No	-	No
Results	-	ACC	-	ACC

REMARKS:

ACC - Acceptable

+ 1000 cycles with 60 operations per minute except the first 10 operations are made as rapidly as possible. Values in brackets are the time values for the 1000 cycles.

DIELECTRIC WITHSTAND TEST:

METHOD

To be tested in accordance with Section 49 of UL 508 (Industrial Control Equipment Standard) Seventeenth Edition.

	VOLTS AC	RESULTS
SWITCH OPEN - LIVE PARTS TO ENCLOSURE	1480	NB
SWITCH CLOSED - LIVE PARTS TO ENCLOSURE	1480	NB
BETWEEN TERMINALS OF OPPOSITE POLARITY	1480	NB
UNINSULATED LIVE PARTS OF DIFFERENT CIRCUITS	1480	NB

REMARKS: NB - No Breakdown

SHORT CIRCUIT TEST

METHOD

Samples of the BR01-40-01-01 as noted were subjected to this test. The devices were mounted in an enclosure as noted. They were subjected to a short circuit test on a 3 phase circuit calibrated to deliver the current at the voltage and power factor indicated below. The devices were connected using 4 feet of wire per terminal and the enclosure was connected through a 30 A cartridge fuse to the live pole least likely to strike to ground by a No. 10 AWG copper wire 4-6 feet long.

Notes:

1. Tests with fuses were conducted with a 10-12 inch length of conduit. Conduit may be omitted when tests are conducted with circuit breakers.
2. Wire size = 125% of maximum FLA
3. Ground fuse has interruptability rating equal to the short circuit test current.
4. \leq 200 hp, two shots. $>$ 200 hp, one shot.

RESULTS

Cat No.	Shot No.	O.L. R. AMP Range	Wire size AWG	BCPD		S.C. Parameter			Enclosure		Ground	OLR Heaters	Fire	Comments
				Type	Amp Rating	Current kA	Volt s	pf	Type	Dimension s WxHxD	Wire No. 10 AWG			
BR01-40-01-01	1		12	F	30	5.126	482	0.77	Meta 1	20x15x15	ok	-	no	Fuses blown
BR01-40-01-01	2		12	F	30	5.126	482	0.77	Meta 1	20x15x15	ok	-	no	Fuses blown

TEST RECORD NO. 2

SAMPLES:

Expansion of relays, type BR01 for Canadian market, does not require testing due to the fact those models fulfilled all requirements during the previous evaluation under UL 508 - see E76343, report date 2004-03-05. Those relays are identical to previously evaluated and there is no construction changing.

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by

Reviewed by:

George Sayed
Project Engineer
UL International Germany GmbH

Stefan Ost
Reviewing Engineer
UL International Germany GmbH

Marcin Lohmann
Engineer
UL International Polska

Any information and documentation provided to you involving UL Mark services are provided on behalf of Underwriters Laboratories Inc.

TEST RECORD NO. 3_

SAMPLES:

No representative production samples of the Industrial Control Switches, Type BR01 constructed as described herein, was submitted by the manufacturer for examination and test.

Employs the alternate Housing, Sandwich Plate and Bobbin material by A SCHULMAN GMBH, Type 66 GF 25 (rated V-0, 130°C) (E86615).

Employs the alternate coil winding, ANSI Grade MW75 or MW79, rated minimum 130°C.

Employs the alternate polyester film insulating tape, rated minimum 125°C.

GENERAL:

Test results relate only to the items tested.

Testing of the Industrial Control Switches, Relay Types BR01 was not considered necessary based on the results of previous investigations.

Tests were considered covered as follows:

Model	Test	File	TReport Date	Test Record No.
BR01	ALL	E76343	2004-03-05	1

Test Record Summary:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in the Standard for Industrial Control Equipment, UL508 17th edition, revised April 15, 2010 and Industrial Control Equipment, CSA C22.2 No. 14-10, revised February 2010 and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

Katherine Matthew
Project Handler II

Reviewed by:

Ronald Breschini
Senior Staff Engineer

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

TEST RECORD NO. 4

SAMPLES:

No representative production samples of the Industrial Control Switches, Type BR01 constructed as described herein, was submitted by the manufacturer for examination and test. Revisions were made based on technical information provided by the manufacturer.

GENERAL:

Test results relate only to the items tested.

Switching bridge employed in Types mentioned above is being molded from alternate R/C (QMFZ2) material, Type "RALUPOL" UP 4385, Raschig GMBH (E75850). The material has the same or better parameters as already used materials, therefore no additional electrical or mechanical tests were considered necessary.

Tests were considered covered as follows:

Test	File	Report Date	Test Record No.
ALL	E76343	2004-03-05	1

TEST RECORD SUMMARY

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in Standard for Industrial Control Equipment, UL 508, 17th Edition, revision 2013-10-16 and C22.2 No. 14-13, 12th Edition, issued 2013-03-01, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

Adrian Równicki
Project Engineer
UL International Polska Sp. z o.o.

Supervised by:

Paweł Stankiewicz
Engineering Leader
UL International Polska Sp. z o.o.

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

TEST RECORD NO. 5

SAMPLES:

A representative production sample of the _Relay Type BR01, was submitted by the manufacturer for examination.

GENERAL:

Test results relate only to the items tested.

Employs alternative polymeric material Radiflam A RV250 AF for housing, sandwich plate and bobbin housing.

Employs alternative polymeric material Valox DR48V for bobbin.

The materials have same or better parameters as already used materials, therefore no additional electrical or mechanical tests were considered necessary.

Minimum thicknesses of housing, sandwich plate, bobbin housing and bobbin were evaluated and updated with regard to direct support of live parts.

Construction of housing was updated by the manufacturer (insert of intermediate ribs). This modification does not result in electrical or mechanical behavior, therefore no additional tests were considered necessary.

Tests were considered covered as follows:

Model	Test	File	Report Date	Test Record No.
BR01	All	E76343	2004-03-05	1-4

The test methods and results of the above tests have been reviewed and found to comply with the requirements in the Standard for Industrial Control Equipment, UL 508.

Test Record Summary:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in the Standard for Industrial Control Equipment, UL 508 17th edition, revised 2013-10-16 and Industrial Control Equipment, CSA C22.2 No. 14-13 12th edition, revised March 2013 and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

Dirk Wohlfahrt
Project Engineer
UL Internatinal Germany GmbH

Reviewed by:

Guido Bitter
Senior Staff Engineer
UL International Germany GmbH

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

CONCLUSION

Samples of the products covered by this Report have been found to comply with the requirements covering the category and the products are judged to be eligible for Listing and Follow-Up Service. The manufacturer is authorized to use the UL Mark on such products which comply with the Follow-Up Service Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the UL Mark are considered as Listed by Underwriters Laboratories Inc.

Report by:

Karsten Henrici

Karsten Henrici
Project Engineer
UL International Germany GmbH

Reviewed by:

Dirk Mueller

Dirk Mueller
Engineering Manager
UL International Germany GmbH

Pursuant to the Corporate Services Agreement between Underwriters Laboratories ("UL") and UL International Germany GmbH, UL hereby accepts and issues this report.